

SN 09/298,297
Docket No. S-91,732
In Response to Office Action dated December 6, 2004

AMENDMENTS TO THE SPECIFICATION:

Please replace the Abstract with the following amended paragraph:

~~Photoinduced charge transfer materials for nonlinear optical applications. A~~
method using polyelectrolyte self-assembly for preparing multi-layered organic
molecular materials having individual layers which exhibit ultrafast electron and/or
energy transfer in a controlled direction occurring over the entire structure is described.
~~The construction of thin films utilizing these materials leads to enhanced nonlinear~~
~~optical effects such as photoinduced changes in the refractive index. Using a high~~
molecular weight, water-soluble, anionic form of poly-phenylene vinylene, self-
assembled films can be formed which show high photoluminescence quantum
efficiency (QE). The highest emission QE is achieved using poly(propylene-imine)
(PPIV) dendrimers as cationic binders. Self-quenching of the luminescence is observed
as the solid polymer film thickness is increased. This self-quenching and can be
reversed by inserting additional spacer layers of transparent polyelectrolytes between
each active conjugated layer, such that the QE grows with thickness. A red shift of the
luminescence (up to 75 nm) is also observed as additional PPV layers are added. This
effect persists as the self-quenching is eliminated, ~~implying a longer range effect, and~~
~~the effect along with the increase in QE are both attributed to a change in the~~
~~conformation of the polymer chains as the superstructure is assembled, together with~~
~~efficient Förster energy transfer in a preferred direction away from the substrate toward~~
~~layers with longer effective conjugation length. In addition to this unidirectional energy~~
~~transfer, charge~~Charge transfer superlattices can be formed by additionally
incorporating C₆₀ acceptor layers. ~~Although the fullerene layer induces only a minor~~
~~change in the absorbance of the film, the emission from the conjugated polymer layers~~
~~is nearly completely quenched. This indicates photoinduced charge transfer to the~~
~~fullerene top layer with high efficiency and preferred direction. Hence the required~~
~~molecular level control over photo-induced charge and energy transfer, together with~~
~~ordered molecular orientation have been demonstrated.~~